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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/538,004	06/03/2005	Akinori Taira	2611-0234PUS1	6865

2292 7590 01/07/2009
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EXAMINER	
LEE, SIU M	

ART UNIT	PAPER NUMBER
2611	

NOTIFICATION DATE	DELIVERY MODE
01/07/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary	Application No.	Applicant(s)	
	10/538,004	TAIRA, AKINORI	
	Examiner	Art Unit	
	SIU M. LEE	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 September 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *16-30* is/are pending in the application.

4a) Of the above claim(s) *18-21,23,24 and 27-30* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *16,22 and 25* is/are rejected.

7)☒ Claim(s) *17 and 26* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 June 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/4/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. This application contains claims directed to the following patentably distinct species:

Species 1) Figure 1 (claims 16, 17, 22, 25, 26, first embodiment that uses a common pilot generator in the multicarrier radio communication system).

Species 2) Figure 4 (claims 18, 19, 23, 27, 28, second embodiment that uses a same period pilot generator in the multicarrier radio communication system).

Species 3) Figure 6 (claims 20, 21, 24, 29, 30, third embodiment that uses a copying unit to generate the common pilot in the multicarrier radio communication system).

The species are independent or distinct because claims to the different species recite the mutually exclusive characteristics of such species. In addition, these species are not obvious variants of each other based on the current record.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, there is no generic claim.

According to page 13 of the amendment filed on 9/26/2008, the applicant would elect the species drawn to Fig. 1, i.e. claims 16,17, 22, 25, and 26. Therefore, the examiner will examine species I (claims 16, 17, 22, 25, and 26).

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ma et al. (US 2003/0072255 A1) in view of Ketchum et al. (US 2004/0179627 A1).

Ma et al. disclose a receiver comprising:

a receiving antenna for each channel (a first antenna 734 for a first channel and a second antenna 735 for a second channel as shown in figure 7A);

an initial synchronization unit (coarse synchronizer 737 for the first channel and coarse synchronizer 741 for the second channel as shown in figure 7A) that establishes a timing synchronization and a frequency synchronization using a common known signal that are common among channels (the common synchronization channel is a universal channel for initial access, it can be used for synchronization and preliminary channel estimation (the examiner interprets the channel estimation is for the timing synchronization and frequency synchronization); and the coarse synchronization is

perform on discrete time samples of a received signal to determine an approximate range of a location of the starting position of the first header symbol, paragraph 0131; the insertion allow user equipment to perform the following fundamental operations including frame and timing synchronization, frequency and sampling clock offset estimation and initial channel estimation, paragraph 0106);

a by-channel known-signal extracting unit (fine synchronization process as shown in figure 7B) that extracts known signals (the complex data $R^{(i,k)}_{SYNC}$ carried by the common synchronization channel of different transmitter is extracted, paragraph 0142) that is spread by a code orthogonal between the channels (the complex data corresponding to a transmitted training sequence is extracted by correlating with a PN code ($PN^{*(i)}_{SYNC}$), paragraph 0142), by channels, from a reception signal for each channel (a fine synchronization is performed for each of one or more receiver antennae after the coarse synchronization, paragraph 0138, lines 1-2), which is a signal received via the receiving antenna, after establishing the timing synchronization (once the coarse synchronization have determined the coarse synchronization position, each fine synchronization searches the frequency domain components in order to locate the precise location of the FFT window by performing correlation measurement between the known PN codes and the frequency component within a searching window defined with respect to the coarse synchronization position, the correlation measurement performed by each fine synchronization are performed for each known PN code, paragraph 0138).

Ma et al. does not explicitly disclose a by-channel known-signal extracting unit that extracts known signals that is spread by a code orthogonal between the channels.

However, Ketchum et al. discloses a MIMO system that for the set of pilot symbols for each antenna is "covered" with a unique orthogonal sequence or code assigned to that antenna; covering is a process whereby a given pilot or data symbol to be transmitted is multiplied by all L chips of an L-chip orthogonal sequence to obtain L covered symbols, which are then transmitted (paragraph 0046).

It is desirable to have a by-channel known-signal extracting unit that extracts known signals that is spread by a code orthogonal between the channels because the covering achieves orthogonal among the pilot transmissions from the antennas and allows a receiver to distinguish the individual transmit antennas. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Ketchum et al. in the device of Ma et al. to support the multiple user and do not consume large portion of the available system resource.

4. Claims 16 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ma et al. (US 2003/0072255 A1).

(1) Regarding claim 16:

Ma et al. discloses a transmitter comprising:

a transmitting antenna for each channel (antenna 21 for the first channel and antenna 23 for the second channel as shown in figure 6);

a transmission-signal generating unit (OFDM component 24 for the first channel and OFDM component 26 for the second channel as shown in figure 6) for each channel that generates a transmission signal for a corresponding channel by allocating

user data, the common known signal, and the known signals by channels according to a prescribed frame format comprising dedicated pilot channel for antenna 21 and common synchronization channel for antenna 21 as shown in figure 6, the transmission signal being a signal to be transmitted via corresponding antenna (the signal transmitted by the first antenna 21 has a symbol format of 201, wherein the first OFDM symbol 13 and a second (identical to the first) OFDM 14 represent the two header OFDM symbols unique to the OFDM frame transmitted by first transmit antenna 21, paragraph 0124, lines 20-24; OFDM symbols 15 and 16 are typically non-identical OFDM symbols made up of a plurality of data symbols, with at least one data symbol indicated generally at 11 on each OFDM sub-carrier, paragraph 0124, lines 28-34, and the same function is perform by the OFDM component 26 to generate the frame format 203 as shown in figure 6) .

a receiver comprising:

a receiving antenna for each channel (a first antenna 734 for a first channel and a second antenna 735 for a second channel as shown in figure 7A);

an initial synchronization unit (coarse synchronizer 737 for the first channel and coarse synchronizer 741 for the second channel as shown in figure 7A) that establishes a timing synchronization and a frequency synchronization using a common known signal that are common among channels (the common synchronization channel is a universal channel for initial access, it can be used for synchronization and preliminary channel estimation (the examiner interprets the channel estimation is for the timing synchronization and frequency synchronization); and the coarse synchronization is

perform on discrete time samples of a received signal to determine an approximate range of a location of the starting position of the first header symbol, paragraph 0131; the insertion allow user equipment to perform the following fundamental operations including frame and timing synchronization, frequency and sampling clock offset estimation and initial channel estimation, paragraph 0106);

a by-channel known-signal extracting unit (fine synchronization process as shown in figure 7B) that extracts known signals (the complex data $R^{(i,k)}{}_{SYNC}$ carried by the common synchronization channel of different transmitter is extracted, paragraph 0142) that is spread by a code orthogonal between the channels (the complex data corresponding to a transmitted training sequence is extracted by correlating with a PN code ($PN^{*(i)}{}_{SYNC}$), paragraph 0142), by channels, from a reception signal for each channel (a fine synchronization is performed for each of one or more receiver antennae after the coarse synchronization, paragraph 0138, lines 1-2), which is a signal received via the receiving antenna, after establishing the timing synchronization (once the coarse synchronization have determined the coarse synchronization position, each fine synchronization searches the frequency domain components in order to locate the precise location of the FFT window by performing correlation measurement between the known PN codes and the frequency component within a searching window defined with respect to the coarse synchronization position, the correlation measurement performed by each fine synchronization are performed for each known PN code, paragraph 0138).

Ma et al. fails to disclose (a) a by-channel known-signal generating unit that generates known signals by channels, the known signals being spread by a code

orthogonal between channels and a common known-signal generating unit that generates a common known signal that is common to the channels, and (b) does not explicitly disclose a by-channel known-signal extracting unit that extracts known signals that is spread by a code orthogonal between the channels.

With respect to (a), Ma et al. discloses a header inserter 29 in figure 6 (each OFDM component 24 and 26 has a respective header inserter 29 which inserts header OFDM symbols, paragraph 0124, lines 14-16) that generates header to the OFDM symbols wherein the header comprises dedicated pilot channel symbols transmitted on the pilot channel sub-carriers 12, 25 are defined by base station/sector specific PN sequence, a set of symbols from a complex pseudo-random PN sequence unique to the base station is mapped on to the dedicated pilot channel subcarrier location in the header OFDM symbols, paragraph 0127 (the examiner interprets this dedicated pilot channel symbols are the same for both channel since it is define by the base station specific PN sequence); the common synchronization channel symbols transmitted on the common synchronization sub-carrier 9, 27 are defined by unique complex pseudo-random PN sequence for each transmit antenna 21 and 23, a set of symbols from this complex pseudo-random PN sequence is mapped onto the common synchronization channel subcarriers in the header OFDM symbols, that is , the common synchronization channel symbols of each frame transmitted through each transmitting antenna use a PN code unique to that transmitting antenna but which is the same for corresponding transmitting antenna of other base station, paragraph 0129, lines 1-11 (the examiner interprets this common synchronization channel symbol is different for each channel

because each transmitting antenna uses a PN code unique to that transmitting antenna).

Ma et al. discloses a header inserter that generates the common synchronization symbol and dedicated pilot symbol and insert the symbols in the common synchronization channel and dedicated pilot channel. It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine to claimed by-channel known-signal generating unit and common known-signal generating unit, since it has been held that forming in one piece an article which has formerly been formed in two pieces and put together involves only routine skill in the art. Howard v. Detroit Stove Works, 150 U.S. 164 (1893).

With respect to (b), Ketchum et al. discloses a MIMO system that for the set of pilot symbols for each antenna is "covered" with a unique orthogonal sequence or code assigned to that antenna; covering is a process whereby a given pilot or data symbol to be transmitted is multiplied by all L chips of an L-chip orthogonal sequence to obtain L covered symbols, which are then transmitted (paragraph 0046).

It is desirable to have a by-channel known-signal extracting unit that extracts known signals that is spread by a code orthogonal between the channels because the covering achieves orthogonal among the pilot transmissions from the antennas and allows a receiver to distinguish the individual transmit antennas. Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to employ the teaching of Ketchum et al. in the device of Ma et al. to support the multiple user and do not consume large portion of the available system resource.

(2) Regarding claim 22:

Ma et al. discloses a transmitter comprising:

a transmitting antenna for each channel (antenna 21 for the first channel and antenna 23 for the second channel as shown in figure 6);

a transmission-signal generating unit (OFDM component 24 for the first channel and OFDM component 26 for the second channel as shown in figure 6) for each channel that generates a transmission signal for a corresponding channel by allocating user data, the common known signal, and the known signals by channels according to a prescribed frame format comprising dedicated pilot channel for antenna 21 and common synchronization channel for antenna 21 as shown in figure 6, the transmission signal being a signal to be transmitted via corresponding antenna (the signal transmitted by the first antenna 21 has a symbol format of 201, wherein the first OFDM symbol 13 and a second (identical to the first) OFDM 14 represent the two header OFDM symbols unique to the OFDM frame transmitted by first transmit antenna 21, paragraph 0124, lines 20-24; OFDM symbols 15 and 16 are typically non-identical OFDM symbols made up of a plurality of data symbols, with at least one data symbol indicated generally at 11 on each OFDM sub-carrier, paragraph 0124, lines 28-34, and the same function is perform by the OFDM component 26 to generate the frame format 203 as shown in figure 6) .

Ma et al. fails to disclose a by-channel known-signal generating unit that generates known signals by channels, the known signals being spread by a code

orthogonal between channels and a common known-signal generating unit that generates a common known signal that is common to the channels.

However, Ma et al. discloses a header inserter 29 in figure 6 (each OFDM component 24 and 26 has a respective header inserter 29 which inserts header OFDM symbols, paragraph 0124, lines 14-16) that generates header to the OFDM symbols wherein the header comprises dedicated pilot channel symbols transmitted on the pilot channel sub-carriers 12, 25 are defined by base station/sector specific PN sequence, a set of symbols from a complex pseudo-random PN sequence unique to the base station is mapped on to the dedicated pilot channel subcarrier location in the header OFDM symbols, paragraph 0127 (the examiner interprets this dedicated pilot channel symbols are the same for both channel since it is define by the base station specific PN sequence); the common synchronization channel symbols transmitted on the common synchronization sub-carrier 9, 27 are defined by unique complex pseudo-random PN sequence for each transmit antenna 21 and 23, a set of symbols from this complex pseudo-random PN sequence is mapped onto the common synchronization channel subcarriers in the header OFDM symbols, that is , the common synchronization channel symbols of each frame transmitted through each transmitting antenna use a PN code unique to that transmitting antenna but which is the same for corresponding transmitting antenna of other base station, paragraph 0129, lines 1-11 (the examiner interprets this common synchronization channel symbol is different for each channel because each transmitting antenna uses a PN code unique to that transmitting antenna).

Ma et al. discloses a header inserter that generates the common synchronization symbol and dedicated pilot symbol and insert the symbols in the common synchronization channel and dedicated pilot channel. It would have been obvious to one having ordinary skill in the art at the time the invention was made to combine to claimed by-channel known-signal generating unit and common known-signal generating unit, since it has been held that forming in one piece an article which has formerly been formed in two pieces and put together involves only routine skill in the art. Howard v. Detroit Stove Works, 150 U.S. 164 (1893).

Allowable Subject Matter

5. Claims 17 and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Subrahmanya et al. (US 20030128678 A1) discloses a method and apparatus for performing frequency tracking based on diversity transmitted pilots in a CDMA communication system.

Ma et al. (US 20040246998 A1) discloses a physical layer structures and initial access schemes in a unsynchronized communication network.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SIU M. LEE whose telephone number is (571)270-1083. The examiner can normally be reached on Mon-Fri, 7:30-4:00 with every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Siu M Lee/
Examiner, Art Unit 2611
12/29/3008

/Chieh M Fan/

Supervisory Patent Examiner, Art Unit 2611